sUAS-based Environmental Sampling in Support of High Energy Laser Weapon Systems

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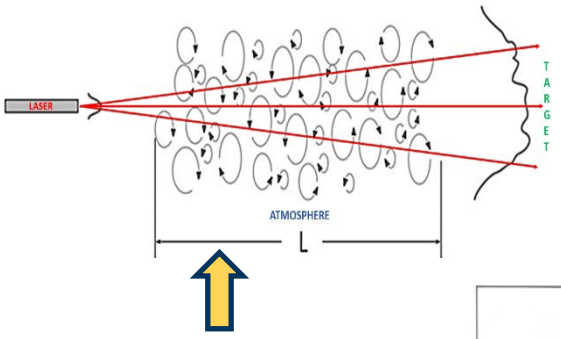
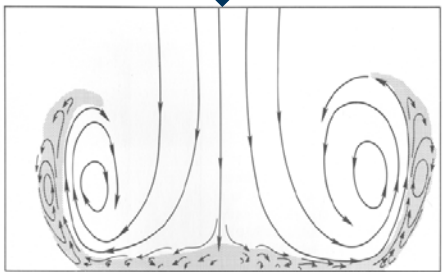
sUAS-based Environmental Sampling in Support of High Energy Laser Weapon Systems (HELWS)



Turbulence in the atmosphere and high energy laser wave front deformation

Propwash of multicopter sUAS affecting the atmospheric turbulence field for low-level flights.



Problem Statement

- We propose developing an optical turbulence sensing capability for multicopter sUAS.
- Differential temperature sensing methods will be adapted to quantifying temperature structure parameters from sUAS. Iterative testing for sensor placement will help mitigate impacts of propwash on turbulence sensing.
- We will identify the potential and limits of using multicopter sUAS for optical scintillation measurements and develop optimal strategies for sampling the undisturbed atmosphere.

Impact

- The new sUAS-based sampling capability greatly increases the potential of obtaining a large amount of data needed to improve our capacity to predict atmospheric optical turbulence.
- Real time data support are made possible by the sUAS – based measurements in support of HELWS operations.
- The system will be tested against similar measurements from towers and possibly fixed-wing sUAS to ensure the sensor performance and the appropriate sampling strategy.

Transition

- Sampling of optical turbulence close to the beam director and along the HEL propagation path are critical information to the warfighters for on-scene, short-time performance prediction.
- Continued support may come from multiple sources, e.g., ONR and Joint Directed Energy Transition Office (DEJTO).
- Extensive collaborations with various Navy HELWS test and evaluation programs such as SSL-TM and HELIOS are ongoing and will continue.

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